

The University of Akron

IdeaExchange@UAkron

Williams Honors College, Honors Research
Projects

The Dr. Gary B. and Pamela S. Williams Honors
College

Spring 2021

Smoking Cessation Interventions in College Students: A Systematic Review

Rebecca Nussbaum
ren20@zip.s.uakron.edu

Avery Dietz
ajd153@uakron.edu

Follow this and additional works at: https://ideaexchange.uakron.edu/honors_research_projects



Part of the [Cognitive Behavioral Therapy Commons](#), [Community Health Commons](#), and the [Public Health Education and Promotion Commons](#)

Please take a moment to share how this work helps you [through this survey](#). Your feedback will be important as we plan further development of our repository.

Recommended Citation

Nussbaum, Rebecca and Dietz, Avery, "Smoking Cessation Interventions in College Students: A Systematic Review" (2021). *Williams Honors College, Honors Research Projects*. 1293.
https://ideaexchange.uakron.edu/honors_research_projects/1293

This Dissertation/Thesis is brought to you for free and open access by The Dr. Gary B. and Pamela S. Williams Honors College at IdeaExchange@UAkron, the institutional repository of The University of Akron in Akron, Ohio, USA. It has been accepted for inclusion in Williams Honors College, Honors Research Projects by an authorized administrator of IdeaExchange@UAkron. For more information, please contact mjon@uakron.edu, uapress@uakron.edu.

Smoking Cessation Interventions in College Students: A Systematic Review

Avery Dietz & Rebecca Nussbaum

The University of Akron

Author Note

Avery Dietz & Rebecca Nussbaum, School of Nursing, The University of Akron. This paper is in fulfillment for the course: Senior Honors Project, 8200:480. Due April 23, 2021. Instructor Christine Graor, PhD, MSN, CNS, RN.

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Smoking Cessation Interventions in College Students: A Systematic Review

Abstract

Smoking prevalence in college students is increasing and intervention studies have resulted in inconsistent findings. In this systematic review, the following PICO question is addressed: In college students ages 18 to 24, are cognitive-behavioral modification therapies more effective than e-cigarettes in aiding with smoking cessation? Database searches in CINAHL, Medline, and PsycINFO resulted in reviewing 20 primary sources. E-cigarettes are often used instead of conventional cigarettes, though long-term effects are not completely understood. Cognitive interventions, especially coupled with evidence-based medications and other therapies, provided substantial short-term abstinence rates, although longer-term rates were often not examined. Most researchers have examined college students' use or perceptions of e-cigarettes, and their success quitting smoking with cognitive interventions. In general, college students perceive e-cigarettes as less harmful than conventional cigarettes, are less likely to be realistic about the harm of tobacco products, and are more likely to be overly optimistic about their ability to quit smoking.

Introduction

Smoking is a persistent problematic addiction in the United States. Cigarette smoking is the leading preventable cause of death in the United States, causing more than 480,000 deaths each year (Centers for Disease Control and Prevention [CDC], 2019). Smoking affects nearly every organ in the human body and is one of the leading causes of lung cancers. It causes diminished overall health, increased absences from work and school, and increased health care utilization and cost. Smoking is estimated to increase the risk for coronary heart disease and stroke by two to four times and increases the risk of lung cancer for men by 25 times and women

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

by 25.7 times (Centers for Disease Control and Prevention [CDC], 2018). The total economic cost of smoking is more than \$300 billion a year, including nearly \$170 billion in direct medical care for adults, and more than \$156 billion in lost productivity due to premature death and exposure to secondhand smoke (CDC, 2019). Quitting smoking can significantly cut risks of heart attack, stroke, and cancers, and ten years after quitting smoking, the risk for dying from lung cancer drops by half (CDC, 2018).

In 2017, 14% of adults aged 18 years or older smoked cigarettes in the U.S., which is an estimated 34.4 million (CDC, 2019). Also, 64% of adults who have ever smoked did so by 18 years of age and 23% of adults who had ever smoked did so between the ages of 18-26 (CDC, 2019; Peña-Purcell et al., 2018). College students ages 18-24 represent a segment of the young adult population who are susceptible to cigarette smoking initiation and so addressing smoking in young adulthood is a critical health promotion and disease prevention endeavor (Berg et al., 2014; Mantey et al., 2017; Peña-Purcell et al., 2018; Spindle et al., 2017). In the college student population of 18-24-year-olds, smoking addiction is important to study because the habits that college students develop are likely to continue into adult years (Simmons et al., 2004).

Current smoking cessation interventions and cognitive learning interventions, including educational seminars and cognitive behavioral therapies (CBT), are often well-known and evidence-based (Mantey et al., 2017). In recent years, people looking to quit cigarette smoking have turned to other modalities of smoking, such as e-cigarettes, in order to wean off of nicotine (Hershberger et al., 2017). E-cigarettes are electronic nicotine delivery devices that were developed to closely approximate the sensory experience of smoking conventional cigarettes (Sutfin et al., 2013). Little is known about the long-term effects of e-cigarette use. While the use of these products is growing rapidly among adolescents and young adults who are trying to

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

quit smoking, e-cigarette use is growing with those who have never smoked tobacco-cigarettes as well (Spindle et al., 2017).

In the U.S., 10.4% of 18-24-year-olds and 16.1% of 25-44-year-olds smoke (CDC, 2019). The prevalence of young adults, ages 18-24 years, who use e-cigarettes every day or some days increased from 2.4% in 2012 and 2013, to 5.2% in 2015 (Truth Initiative, 2019). A 2015 report from the National Health Interview Survey states that 40% of young adults who use e-cigarettes every day or some days were never smokers before trying e-cigarettes (Truth Initiative, 2019).

Nearly half of young adults in the U.S. attend a college or university, which is important as the prevalence of e-cigarette use is growing in the college student population (Spindle et al., 2016; Sutfin et al., 2013). Despite non-smoking rules on college campuses, there is a decreased compliance to non-smoking rules and regulations (Ickes et al., 2015). Although there is some evidence that e-cigarettes pose less of a health risk than cigarettes, there is limited evidence about longer-term effects of their use (Hershberger et al., 2017; Mantey et al., 2017; Sutfin et al., 2013). Evidence is accumulating supporting negative health effects of e-cigarette use. For example, despite the decreases in cigarette smoking-related harm, transitioning from cigarettes to e-cigarettes has been found to be associated with other problems, such as inflammation or reduced immune defenses in the lungs (Hershberger et al., 2017). However, there is still documentation of e-cigarettes being an effective tool for smoking cessation (Copeland et al., 2016).

Some professionals believe that e-cigarettes have made the current cigarette smoking problem more complicated and have turned a new generation onto smoking as rates of e-cigarette

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

use has increased in young adult college students (Spindle et al., 2016; Truth Initiative, 2019). For those who are serious about quitting smoking, it is important to find a smoking cessation method that will ensure sustained cessation. Using an evidence-based approach to smoking cessation will help not only those looking to quit now but may help those who will want to quit in the future and will hopefully put an end to smoking. Therefore, the purpose of this systematic review is to review and critically appraise the evidence about the effectiveness of cognitive interventions, compared with weaning with e-cigarette use, on smoking cessation in college students. The review will answer the following PICO question: In college students ages 18 to 24 years, are cognitive-behavioral modification therapies more effective than e-cigarettes in aiding with smoking cessation? This systematic review is important to nursing because nurses play a key role in influencing the health of patients. Whether working in a hospital or the community, nurses are ideally placed to help smokers make decisions about smoking cessation and to encourage smokers to give up cigarette use. Even the most basic intervention by a health professional may have a profound effect on helping and encouraging a smoker to make decisions to stop or to seek help in stopping. Knowing the best evidence-based intervention to enhance compliance of quitting is important, especially in the college age group, as college students are in a transition period of their life where they either quit or become nicotine dependent (Simmons et al., 2004). College students are also less likely to be realistic about the harm of tobacco products and more likely to be overly optimistic about their ability to quit (Peña-Purcell et al., 2018; Walton et al., 2019).

Methods

This paper addresses the gap in evidence for college students and smoking cessation methods. The search and review protocol is based on the Preferred Reporting Items and Meta-

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Analysis (PRISMA) guidelines. Key search terms included college students, behavioral modification therapies, perceptions, smoking, young adults, smoking cessation, e-cigarettes, anxiety, advertising, depression, united states, us, usa, dependence, intervention, counseling, therapy, psychotherapy, treatment. Inclusion criteria were: study publications within 2014 to 2019, in English, intervention studies, United States. Databases included CINAHL, Medline, and PsycINFO. The number of publications retrieved through keyword searches were 300. See PRISMA chart in Appendix A. Duplicates were removed automatically. No additional publications were identified through other sources. Further screening for relevance included college age, peer-reviewed, Boolean operators OR and AND; a total of 150 publications were retained. Further publications were excluded (n=150) from further reviews and were based on adults who were pregnant, older adult population, and non-primary sources. Full-text articles assessed for eligibility were 50 based on the PICO question. Full-text articles based on inclusion/exclusion criteria totaled 100. Studies included in the review are 20. Publications were searched in databases manually and based on relevance to the PICO question. Key retained studies were all primary sources about the effectiveness of intervention on smoking cessation in college students. Risk of bias included preconceived beliefs of authors, which was addressed by intentionally including all relevant studies regardless of findings. Studies were also selected based on a preliminary screening for increased internal and external validity. One study from Brazil and two studies older than 2014 were included because of their findings contributed to what is known about smoking habits and behaviors of college students.

Integrated Review of the Literature

Description of studies. Designs included randomized control trials, quasi-experimental, controlled randomization, two group pretest and posttest, experimental, and one study was a

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

pilot. Within the study designs, the level of evidence is two, three, and four. Data collection methods were cross-sectional, prospective, and longitudinal. Sampling methods were convenience sampling with some randomized group assignment. Sites included Minnesota, North Carolina, Connecticut, New York, Virginia, Louisiana, Ohio, Wisconsin, Texas, and California at different universities, as well as southern, southeastern, and midwestern universities not specified, and a Brazilian university hospital. Sample sizes of the different studies ranged from 90 participants to 9,077 participants. Variables and measures included addictive behavior, social norms, effects of e-cigarette advertising and use, health behaviors, prevalence, mechanisms of cognitive interventions, perceptions of e-cigarettes usage, smoking status and behaviors, and noncompliance to tobacco-free policies. Internal validity was enhanced in some studies with random group assignment and external validity was enhanced in some studies with randomized sampling. Limitations of studies include limited generalizability of findings, no examination of long-term abstinence rates, smaller samples, and risk of social desirability bias. In addition, external validity was threatened by one study done outside of the U.S. (Brazil) because we aimed to study U.S. college students. Also, external validity was threatened because the some of the samples were dominated by women. Gaps of knowledge across all studies included findings distinguishing between nondaily and daily smokers, rather than smokers and non-smokers, and effective interventions for maintaining abstinence from conventional cigarettes smoking and measures to track abstinence of college students and young adults.

Smoking literature. While daily smoking in the United States has decreased, it is unknown whether the decrease is transitory or if the decrease is sustained. Regardless, cigarette smoking continues to be highly associated with smoking related morbidity and mortality (Berg et al., 2014). It is difficult to promote smoking cessation in nondaily smokers because this patient

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

population does not seek treatment, they do not see themselves as smokers, do not think they can quit, and do not think that quitting is important (Berg et al., 2014). Smoking cessation is complex due to the prevalence of nondaily college student smokers (Berg et al., 2014), perceptions of addictiveness to nicotine replacement therapies such as e-cigarettes (Cooper et al., 2017), the effect of cigarette advertising (Lee et al., 2018), and because the addiction is established if students had previous experience before coming to college (Loukas et al., 2016). Interventions for college students need to be unique to promote smoking cessation.

Nicotine found in cigarettes and selected e-cigarettes is highly addictive, which leads to physiological cravings and withdrawal and/or tolerance to the substance. College students who are addicted to e-cigarettes or conventional cigarettes require interventions that will be noticeable and effective. It is important that college students receive interventions that help reconstruct thoughts due to the effect of addiction on the brain. Cognitive behavioral therapy (CBT) may increase self-efficacy and support smoking cessation when smokers have negative thinking or feel negative emotions leading to smoking (Spears et al., 2017). CBT helps to increase coping and decrease stress in order to abstain from lapsing (Spears et al., 2017). Not only is utilizing one substance (cigarettes, e-cigarettes, etc) prevalent, but smoking at a younger age and addiction may impact use of cigarettes and use of alternative products later (Loukas et al., 2016).

In addition to the addictive nature of nicotine in conventional cigarettes, e-cigarettes also contain nicotine. College students who use e-cigarettes do not view them as more addictive than cigarettes and may not be using them to stop smoking, although the effectiveness of this use is not completely understood (Copeland et al., 2017; Trumbo & Kim, 2015). Also, those who are non-daily smokers may transition to smoking daily (Berg et al., 2014). Therefore, it is important to address the behavior with college students who become daily smokers. It is important to share

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

this information with everyone as a primary prevention to prevent people from smoking as well as encouraging current smokers to stop smoking.

Cognitive interventions. Many researchers have examined the effect of cognitive interventions on smoking cessation. Cognitive interventions challenge irrational thoughts in order to help cigarette smokers change and manage thought and feelings more effectively. By understanding how emotions and thinking affect decisions, it may help people make conscious choices to break unhealthy habits and establish healthier habits. Cognitive interventions may also help address the symptoms of physical dependence in smokers (Spears et al., 2017). Approaches to smoking cessation should be tailored to the population because college students may not respond to non-interactive, traditional methods in order to alter behavior and attitudes (Simmons et al., 2004). This may be due to competing demands and the integration of technology in their daily lives, which may make it more comfortable for smoking cessation in college students. For example, in a randomized control trial (n=122 current college student smokers), adherence to the interventions by the end of the trial was 73% with the 20 day online cognitive behavioral smoking cessation intervention versus 34% using the control intervention. Retention of the strategies at the end of the trial was 85.7% for the cognitive behavioral smoking cessation program compared to 83.1% for the control intervention using the American Cancer Society's Guide to Quitting Smoking. This is important data supports the possibility of using more common means (i.e., internet modules) to produce higher smoking cessation rates in the college student population. Also, by the end of the trial, a change in smoking behavior to induce cessation was 16.3% in the control group and 20.0% in the intervention group, showing that the intervention group provided a higher incidence in smoking cessation (Berg et al., 2014). When participants were followed up on, participants of the intervention group showed an 18.9%

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

sustained abstinence versus 16.7% of the participants in the control group (Berg et al., 2014). The study results showed a significant difference in smoking cessation favoring the intervention condition. However, the study should be done on a larger population to ensure significant differences between control and intervention groups. Despite this, the intervention was effective because it led to an increase in quit attempts and a decrease in cigarettes smoked per day (Berg et al., 2014).

These findings are consistent with others (Campos et al., 2018; Thomas et al., 2015). For example, Thomas and colleagues (2015) conducted a randomized control trial (n=1217 college students) to determine the effect of an intervention called Quit and Win, which utilized motivational interviewing with cognitive behavioral therapy (MI with CBT) and added financial incentives in the form of contests to induce smoking cessation. At the end of the 12-week study, there was no difference in abstinence between participants treated with MI with CBT versus those who did not have MI with CBT, however, only 20% of those in the intervention group used all counseling sessions, and half of college students who did not use any form of smoking cessation assistance, such as nicotine replacement therapy patch, medications, and counseling, had a 5% abstinence rate at the end of six months (Thomas et al., 2015). Compared to the 5% abstinence rate using no smoking cessation assistance, those with multiple incentives in the Thomas and colleague study (2015) had a continuous abstinence rate of 16.3% using multiple incentives, whereas single incentives had a rate of 11.1% by the end of the six-month follow-up. Those who received multiple financial incentives with or without counseling for smoking cessation throughout the study had abstinence rates at 19.3% versus a single financial incentive with 10.3% abstinence (Thomas et al., 2015). A prospective randomized study of 81 smokers by Campos et al. (2018) compared abstinence rates between two interventions, which were brief

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

counseling or intense cognitive behavioral intervention coupled with a video. Of the 81 participants, 40.7% remained abstinent after six months, with 72.7% of abstinent participants being from the intense intervention group. Results show that 59.3% of the participants relapsed, with 35.4% of the participants being from the intense intervention group (Campos et al., 2018). While relapse was highly influenced by mild to moderate cravings and seen with both the intense and brief counseling intervention groups, the intense intervention produced the highest abstinence rates (40.7%) (Campos et al., 2018). The study by Campos et al. (2018) focused on young adults rather than college students, though both Campos et al. (2018) and Thomas et al. (2015) looked at smoking cessation strategies utilizing cognitive behavioral techniques and found decreased abstinence rates with cognitive behavioral interventions, the long term, sustained effect of abstinence must be considered. Providing multiple evidence-based practice interventions for college students facing the physiological nicotine cravings for cigarettes is important for smoking cessation. This may include cognitive interventions, medications, and other strategies for healthy behavior to encourage students to use resources to their fullest potential to maintain abstinence.

Cognitive interventions, including mindfulness, and compared with usual care, have been found to decrease stress, anxiety, intention to start smoking, and increased self-efficacy and awareness, supporting that providing initial education on the feasibility of smoking cessation decreased intentions in smokers (Simmons et al., 2004; Spears et al., 2017). Usual care for smoking cessation included individual counseling for five or ten minutes with a goal to establish problem solving skills and coping skills for smoking cessation to include awareness that cravings, rapid emotional changes, and stress may increase relapse risk. (Campos et al., 2018; Spears et al., 2017). While neither study restricted their study demographic to college students in

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

the inclusion criteria and one study had a mean age of 51 years, study findings may have implications for research using similar interventions in college students because cessation of an addiction still produces similar emotions no matter the age of the client. By targeting the process of thoughts in relation to addiction, cognitive behavioral interventions can enable someone of any age to quit. The means of carrying out the cognitive behavioral interventions should be tailored to the population it is attempting to serve.

Tobacco-free campus policies are another approach to promoting smoking cessation. However, enforcing compliance while understanding influences on noncompliance is imperative (Ickes et al., 2015; Record, 2017). A college study of 23 campus locations investigated if enforcement would affect compliance rates and found that when approached sternly and compassionately, compliance rates increased to 89% in the first part of data collection and to 98% in the second wave of data collection (Ickes et al., 2015). In another study using questionnaires to investigate what influenced college students to be noncompliant, researchers found that despite addiction being related to noncompliance, noncompliance was more likely to be induced by perceived attitudes, subjective norms, and behavioral control (Record, 2017). It may be socially normative for college students to smoke, which is different in the older smoker population where it is no longer socially acceptable. While Ickes et al. (2015) did not investigate addiction or motives behind noncompliance but only enforcement of the policy, both studies analyzed college campus tobacco-free policy compliance. Based on findings, college students may need active interventions such as personal approaches to induce campus policy compliance. This may increase difficulty for students to smoke conventional cigarettes or other forms of nicotine while decreasing the frequency of smoking.

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

E-cigarette use. Electronic cigarette use has increased during the last few years, especially among college students (Cooper et al, 2017; Kenne et al., 2016). Multiple researchers analyzed the perceptions, social norms, or patterns of e-cigarette use among college students (Camenga et al., 2017; Cooper et al., 2017; Copeland et al., 2017; Hershberger et al., 2017; Kenne et al., 2016; Lanza & Teeter, 2018; Loukas et al., 2016; Record, 2017; Saddleson et al., 2015; Spindle et al., 2017; Suftin et al., 2013). One reported reasoning for the increased use may be that many individuals view e-cigarettes as safer and more beneficial, as 45% of e-cigarette users reported they are safer than conventional cigarettes (Hershberger et al., 2017; Sutfin et al., 2013). Such beliefs are more prevalent in those who are current e-cigarette or cigarette users (Cooper et al., 2017; Hershberger et al, 2017) compared with those who are nonsmokers. Copeland et al. (2016) conducted a study that aimed to identify the perceptions about the safety and usefulness of e-cigarettes as a cessation tool among college students (n=734). Initial findings suggested that college students endorsed views that e-cigarettes are safe alternatives to traditional tobacco cigarettes and reported high acceptance levels for public use. Findings supported initial evidence that in individuals using e-cigarettes, there are perceptions of more benefits associated with e-cigarettes as compared to non-users. They also found that there was not a significant difference among smoking status groups, those who smoked conventional cigarettes versus e-cigarette users, in reporting perceived risks associated with e-cigarette use, showing that these populations do not fully understand the risks and benefits of e-cigarettes given the increased marketing of them and their increased use on college campuses (Copeland et al., 2016). It is unknown how the perceptions of e-cigarettes as a safer alternative started, however, these perceptions are heavily influenced by advertising for the products and use among young adults, including college students.

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Perceptions of health benefits were found to differ in Lanza & Teeter's (2018) study of college students (n=452). In this study, 40.7% stated that e-cigarettes are not healthier than conventional cigarettes, whereas 23.8% stated that e-cigarettes are healthier than conventional cigarettes (Lanza & Teeter, 2018). Despite the higher percentage of students thinking e-cigarettes are not healthier than conventional cigarettes, 76.2% stated that they would still use an e-cigarette versus a conventional cigarette (Lanza & Teeter, 2018). Also, in a cross-sectional study (n=189 young adults) conducted by Camenga et al. (2016), findings suggested that use of e-cigarettes to quit smoking was not associated with perceptions that e-cigarettes are safer than cigarettes. Rather, they were not associated with current or former cigarette smoker status, that they help with quitting smoking, or are safer than smoking cessation medications. However, in gathering information from the different studies it can be concluded that there is not enough evidence to definitively support that perceptions of low risk in e-cigarette use relate to cessation behavior in adolescents and young adults. Although the possibility of using e-cigarettes to quit smoking is perceived to be plausible, the effectiveness of using e-cigarettes to wean off of conventional cigarettes in the population of college students has yet to be determined.

Researchers have examined the use of e-cigarettes on cigarette smoking cessation, and findings are mixed. For example, Mantey et al. (2017) examined a cohort of young adults (n=627) and found that use of e-cigarettes for cigarette smoking cessation, relative to no e-cigarette use, was associated with greater odds of cigarette cessation in young adult former and current smokers. These findings compare with those by Saddleson et al. (2015) and Spindle et al. (2016) who found that e-cigarettes were reinforcing smoking habits, resulting in some individuals to take up cigarette smoking. This may be a result of delivering nicotine and/or providing certain sensory stimuli, thus serving as a catalyst to trying other tobacco products that

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

are reinforcing in a similar manner (Spindle et al., 2016). Findings supporting the effectiveness of e-cigarettes for smoking cessation from Mantey et al. (2017) although encouraging, substantiates the need for further studies to determine the reliability and generalizability of the study findings and other contributing factors on the efficacy of e-cigarettes as a cessation aid.

Finally, Camenga et al. (2016) found that 41.8% of adolescents and young adults with a history of established smoking (n=189) have ever used e-cigarettes to quit smoking and 47.1% of participants believed that e-cigarettes help people quit smoking. Additionally, 80% of adult cigarette smokers who had switched to exclusive e-cigarette use in the past year reported that e-cigarettes helped them quit smoking cigarettes (Camenga et al., 2016). There was an association between increased frequency of e-cigarette use and increased use of e-cigarettes to quit smoking (Camenga et al., 2016). Although there is a promising percentage of those who used e-cigarettes to quit in the above study, abstinence rates were not measured, so the success in using e-cigarettes for smoking cessation is still unknown. Further research is needed to determine whether e-cigarette use leads to quit attempts and abstinence among this population. Use of e-cigarettes suggests that although many are no longer smoking cigarettes, college students are continuing to use products containing nicotine. As people continually use e-cigarettes, the purpose of them as a tool to wean off conventional cigarettes and to stop smoking completely loses credibility, as with e-cigarettes it is still possible to have nicotine delivery. The addiction problem of nicotine is not addressed because college students may not be weaning off their next device of nicotine delivery, which is e-cigarettes.

Although e-cigarette use was more common among cigarette smokers than non-smokers, 12% of e-cigarette users have never smoked cigarettes (Sutfin et al., 2013). Kenne et al. (2016) reported a similar statistic with 13.9% of sample university students who never smoked

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

(n=9,077) who said they tried e-cigs. Recent findings support that positive beliefs about e-cigarettes can lead to later use (Copeland et al, 2016; Hershberger et al, 2017). Also, among current cigarette smokers, e-cigarette use was not related to intentions to quit cigarette smoking (Sutfin et al., 2013). While older, more established smokers may intentionally use e-cigarettes to help them quit smoking, findings from multiple studies suggest that quit intentions do not play a critical role in e-cigarette use in the college population, and younger people are less likely to use e-cigarettes for this reason (Copeland et al., 2016; Saddleson et al., 2015; Sutfin et al., 2013). While there is evidence that college students perceive electronic cigarettes to be helpful in aiding in cessation attempts, college students are not using them to stop smoking (Copeland et al., 2016; Sutfin et al, 2013). In one study of young adults (n=627), 19.1% reported use of e-cigarettes in the past 30 days for reasons other than cigarette smoking cessation while 18.5% reported use of e-cigarettes for cigarette smoking cessation (Mantey et al., 2017). These findings were contrary to others that found that daily e-cigarette users often reported their use for quitting/reduction of smoking (Camenga et al., 2016).

College students not only use electronic cigarettes to stop smoking, but also because e-cigarettes are perceived as normal products to use within their social groups (Copeland et al., 2016; Lanza & Teeter, 2018; Spindle et al., 2016). For example, many college students perceive e-cigarettes to be appealing because of the new experience, the risky behavior, its use as a coping mechanism, its perceived trendiness, and because of its social acceptability (Lanza & Teeter, 2018). If e-cigarettes are perceived as a societal norm, then their use may not decrease. College students may also fail to notice that they still receive nicotine with electronic cigarettes if they had never used a conventional cigarette (Lanza & Teeter, 2018). If college students are less apt to report nicotine in e-cigarettes, they may use e-cigarettes more often. While findings add to the

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

significance of smoking cessation interventions in college students, this study may have been influenced by social desirability bias and needs to be interpreted with caution. Findings also need to be duplicated in a larger sample to understand what factors (i.e. smoking cessation, new experience, etc.) influence college students to initiate e-cigarette use.

Critical Appraisal

This systematic review examined the evidence about current smoking cessation intervention strategies for U.S. college students aged 18 to 24 years. When appraising this evidence, few interventional studies were found. A limited quantity of research with strong evidence on the effectiveness of smoking cessation strategies for this population exists. The number of studies considered for review was narrowed due to their relevance to the question this review aimed to explore. This section will discuss the limitations of findings, reliability of findings, and analyze the validity of methods researchers used.

Limitations of findings. The age range of the participants in these studies is an important indicator of the ability to generalize findings to the age group of interest. Many researchers examined college students aged 18 to 24-years (Berg et al., 2014; Camenga et al., 2017; Cooper et al., 2017; Copeland et al., 2017; Kenne et al., 2016; Lee et al., 2018; Loukas et al., 2016; Mantey et al., 2017; Saddleson et al., 2015; Simmons et al., 2004; Spindle et al., 2017; Sutfin et al., 2013; Thomas et al., 2015; and Trumbo & Kim, 2015). However, other researchers studied college students outside of the 18-to-24-year age range and one study did not include college students in their criteria, therefore those results should be carefully applied to college students (Campos et al., 2018; Hershberger et al., 2017; Ickes et al., 2015; Lanza & Teeter, 2018; Record, 2017; and Spears et al., 2017). Although researchers with college student participants outside of the desired range increased understanding about the topic, the findings from their research cannot

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

be generalized to the 18 to 24-year-old age group without affecting the validity of the findings for the population and validity of methods. This limits the ability to use the information in these studies for understanding the use of e-cigarettes among the young adult population and effective cessation interventions.

Location and timing can affect study results. Cooper et al. (2017), Loukas et al. (2016), and Trumbo & Kim (2015) researched students at only one college or university. Findings may not be generalizable to other college students at other universities in the state or even across the U.S., and a cross section of geographic areas would provide more reliable data for the college student population. A lack of data from varied geographical areas is also a considerable limitation. Researchers who conducted their studies in the southern part of the United States may be in a location where smoking is a societal norm or more acceptable (Berg et al., 2014; Copeland et al., 2017; Cooper et al., 2017; Ickes et al., 2015; Loukas et al., 2016; Mantey et al., 2017; Record, 2017; Simmons et al., 2004; Spears et al., 2017; Spindle et al., 2017; Suftin et al., 2013; Thomas et al., 2015; Trumbo et al., 2015). The study by Campos et al. (2018) was located outside of the U.S. which affects generalizability to the U.S. college student population. The southern states are not representative to the entire United States population, as conventional smoking habits and perceptions of college students could widely vary across the nation. Timing of these studies occurred before the reports from the CDC (Centers for Disease Control and Prevention, 2020) on the risk of e-cigarettes and is another limitation. Therefore, results should be interpreted with caution.

The sample size of the studies provides important information when attempting to generalize the results. A larger sample size decreases bias and notes differences between college students who do not use e-cigarettes as a cessation tool and those who do not (Copeland et al.,

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

2017; Cooper et al., 2017; Hershbeger et al., 2017; Ickes et al., 2015; Kenne et al., 2016; Mantey et al., 2017; Lanza & Teeter, 2018; Lee et al., 2018; Loukas et al., 2016; Record, 2017; Saddleson et al., 2015; Spears et al., 2017; Spindle et al., 2017; Suftin et al., 2013; Thomas et al., 2015). Small sample sizes limit generalizability of the study results to the desired population and possible cessation interventions (Berg et al, 2014; Camenga et al, 2017; Campos et al, 2018; Simmons et al, 2004; Trumbo & Kim, 2015). Future studies should have larger sample sizes. Differences among use of e-cigarettes help health practitioners in recommending appropriate interventions.

Validity of methods. Ideally, when deciding whether evidence is strong and trustworthy, both the study's design and the appraised methodological quality should be considered. Many researchers used randomized control trials (RCTs), which are valid methods of collecting data and are important in understanding the effectiveness of CBT interventions as well as e-cigarette interventions in smoking cessation (Berg et al., 2014; Campos et al., 2018; Copeland et al., 2017; Lee et al., 2018; Record, 2017; Spears et al., 2017; Spindle et al., 2017; Sutfin et al., 2013; Thomas et al., 2015). RCTs are considered to be a higher level of evidence, as methods that strengthen internal validity are used, therefore strengthening the validity of findings. Loukas et al. (2016) conducted a survey, but did not reveal the details of the distribution of the survey and whether or not participants were sent the survey randomly or if it was distributed in a controlled, non-randomized way. It is difficult to rely on findings when researchers do not explain in detail their methods of carrying out their research. Other study designs utilized by the researchers were cross-sectional (Camenga et al., 2017; Cooper et al., 2017; Kenne et al., 2016; Lanza & Teeter, 2018; Saddleson et al., 2015; Trumbo & Kim, 2015), longitudinal (Mantey et al., 2017), experimental (Simmons et al., 2004), pre-test quasi-experimental (Ickes et al., 2015), and well-

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

designed control trials without randomization (Hershberger et al., 2017). These designs are considered to be a lower level of evidence, which may affect the strength of the data collected by these researchers, therefore limiting the strength and ability to clinically apply the findings.

Reliability of methods and findings. Kenne et al. (2016); Lee et al. (2018); Mantey et al. (2017); Sutfin et al. (2013); and Thomas et al. (2015) used self-administered questionnaires and surveys. Special care must be taken when wording the questions to avoid measurement error and response bias, which are common issues with self-reported surveys. Researchers included the questions asked of the participants in the procedure section of the study, and the questions were written clearly without answer options that would provoke response bias. In Sutfin et al. (2013), one question presented was: *Compared with a regular cigarette, how harmful do you think e-cigarettes are?* The response options were: less harmful, as harmful, more harmful, and do not know. The researchers of these studies made sure to clearly define the questions they asked to make them straight-forward, and include response answers that were well-defined in order to have quality data for review. Mantey et al. (2017) relied solely on self-reported questionnaires for data collection about cigarette use without biochemical validation of cigarette use. Although many studies have found high validity for self-reported tobacco use information, researchers cannot be certain that cigarette and e-cigarette use was accurately reported. By relying on self-reporting, researchers are relying on the honesty of participants which leads to inaccurate data not truly representative of the population. The self-reported information about drug use is considered reliable and valid, however, it still threatens the results related to internal validity (Kenne et al., 2016). Therefore, the validity of the studies cannot be certain as the methods to obtain the evidence may not be reliable. Unreliable methods such as self-administered questionnaires and surveys have the possibility for under or overreporting

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

behaviors or conditions. By relying on self-reporting, researchers are relying on the honesty of participants which leads to inaccurate data that is not truly representative data of the population.

Some researchers used convenience sampling of college students (Camenga et al., 2017; Mantey et al., 2017; Saddleson et al., 2015). Convenience sampling limits generalizability of results to the broader population of young adult, college cigarette smokers, as a whole. Mantey et al. (2017) however had results indicating that students use e-cigarettes for reasons other than smoking cessation (19.1%). Young adult former smokers and current smokers utilized e-cigarettes for smoking cessation. These results were consistent with a cross-sectional and longitudinal study of e-cigarette use in the general population. This consistency between study results suggests reliability of their findings. Future studies are needed to examine the interventions using randomization to improve generalizability.

Limitations across studies. Many researchers did not measure the effectiveness of interventions using cognitive-behavioral therapies (CBT) or e-cigarettes for smoking cessation, but rather implied these strategies may be a useful intervention in the discussion of the results (Camenga et al., 2017; Cooper et al., 2017; Copeland et al., 2017; Hershberger et al., 2017; Kenne et al., 2016; Lanza & Teeter, 2018; Loukas et al., 2016; Record, 2017; Saddleson et al., 2015; Spindle et al., 2017; Sutfin et al., 2013). The research across multiple studies measured the subjects perceptions rather than process, limiting data on the outcomes of interventions (Camenga et al., 2017; Cooper et al., 2017; Copeland et al., 2017; Hershberger et al., 2017; Kenne et al., 2016; Lanza & Teeter, 2018; Loukas et al., 2016; Record, 2017; Saddleson et al., 2015; Spindle et al., 2017; Sutfin et al., 2013). For example, researchers' findings suggest that college students perceive electronic cigarettes to be helpful in aiding in cessation attempts. However, the researchers did not find or measure data suggesting that the college

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

student population is using them to stop smoking. This limits the ability to know if implementing e-cigarettes is an effective cessation intervention aid for conventional smoking and limits the evidence to recommend use in clinical practice.

Some of the researchers did measure the success of the intervention of interest (CBT or e-cigarettes) as a cessation intervention method (Berg et al., 2014; Campos et al., 2018; Mantey et al., 2017; Simmons et al., 2004; Spears et al., 2017; Thomas et al., 2015). For example, Berg et al. (2014) measured the success of a CBT approach on cessation, and Mantey et al. (2017) measured the efficacy of electronic cigarettes as cessation tools. These researchers were able to provide useful and reliable data quantifying the overall effectiveness of these interventions in cessation attempts. This data is imperative and can be used to advance clinical practice and further research. Cognitive therapies provide a safe and effective method in smoking cessation; however, e-cigarettes have not proven to be effective or safe. Furthermore, the long-term effects of e-cigarettes are not widely understood.

Synthesis of Evidence

When compiling the evidence for appraisal, it is evident that there is not much known about the success of any cessation interventions for the college student population. There is more significant evidence for the effectiveness of cognitive-based therapy in aiding cigarette smoking cessation the college student population found in this review. This suggests the superiority of cognitive-behavioral therapies over e-cigarettes for cessation interventions. When looking at cognitive behavioral therapy interventions for this population, the science suggests that these may be safe and effective methods. Scientific evidence has not indicated that e-cigarettes are safe or even effective as cessation tools. Mantey et al. (2017) was the only

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

researcher who measured the effectiveness of e-cigarettes as a type of cessation intervention.

Mantey et al. (2017) stated that their findings suggest e-cigarettes may play a role in increasing college student smoking cessation, but that these findings should be interpreted within the larger context of research on e-cigarettes. Mantey et al. (2017) found in their research that only one other longitudinal analysis of cigarette smokers found e-cigarette use was associated with greater odds of cigarette smoking cessation but only among “long-term” users of e-cigarettes. Long-term use of e-cigarettes have not been proven to be safe for any user, and this suggests the need for further research so that more is known about e-cigarettes and similar devices. Additional research is needed to examine e-cigarettes as a complement to evidence-based cessation resources that are associated with cigarette smoking cessation among young adults, as there is still much that is unknown about this topic.

The current state of science suggests that nicotine gum, patches, and cognitive behavioral strategies may be the most effective strategies for smoking cessation at this time, especially for adults. It is important to find effective methods to reduce the number of conventional cigarette smokers among younger adults and teens. Most research conducted about cessation interventions and efforts analyzes age groups outside of the 18-24-year-old population, making it difficult to apply recommendations to the population of study. Understanding this age group and variables and motivations contributing to their behaviors is an important factor in determining the success of interventions. As nurses, we cannot prescribe smoking cessation medications or interventions. However, we can recommend that they stop smoking. We can advocate for patients who desire resources for smoking cessation to seek advice from their primary care provider.

Recommendations

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Based on this review of the literature, more research is needed on cessation strategies, including methods that utilize technology, and targeted intervention for this population. The Internet is very accessible and proved efficacious in some studies. Current research suggests that young adults, including college students, are in a pivotal time period when new habits are adopted and potentially continue for years. Utilizing a very accessible platform, like the Internet, may prove to be reliable in reaching college students across the entire United States. We also recommend that studies do more follow-up surveys or data collection on outcomes to enhance reliability of their interventions. Current methods, such as the nicotine patch, nicotine gum, and cognitive therapies are being used to help smokers quit, and do show effectiveness. Therefore, these current practices are still reliable. We recommend replication of studies in which CBT showed significant differences in abstinence rates, and recommend that more research into cognitive-based approaches to smoking cessation is done to be confident of their efficacy for the 18–24-year-old college student population. We also recommend that a more diverse population of college students aged 18-24 years of age to address any differences in societal norms, behaviors, and attitudes about the use of CBT and e-cigarettes.

Due to the unknown long-term effects of e-cigarettes, we recommend more research on e-cigarette devices as their popularity has increased significantly in recent years, especially with the teenage and adolescent population. These devices are perceived as safe, though more process research must be done in order for healthcare professionals to understand users' perceptions of safeness. As healthcare professionals, we know that smoking is one of the most preventable causes of premature death. Therefore, we need to understand the risk associated with these newer smoking devices to recommend safe clinical practices. The research shows that using e-cigarettes as a smoking cessation device is not reliable or validated. Other smoking cessation

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

methods based on reliable data are recommended. Statutes that prohibit smoking indoors helped to decrease the popularity and acceptability in geographic locations where this is law. However, the emergence of e-cigarette devices and inappropriate use of them threatens to create new health risks and increase the cost of healthcare. It is necessary to understand these devices to promote health and prevent disease in the college student population.

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

References

- Berg, C. J., Stratton, E., Sokol, M., Santamaria, A., Bryant, L., & Rodriguez, R. (2014). Novel incentives and messaging in an online college smoking intervention. *American Journal of Health Behavior*, 38(5), 668–680. <https://doi-org.ezproxy.uakron.edu:2443/10.5993/AJHB.38.5.4>
- Camenga, D. R., Kong, G., Cavallo, D. A., & Krishnan-Sarin, S. (2017). Current and Former Smokers' Use of Electronic Cigarettes for Quitting Smoking: An Exploratory Study of Adolescents and Young Adults. *Nicotine & Tobacco Research*, 19(12), 1531–1535. doi:10.1093/ntr/ntw248
- Campos, A. C. F., Nani, A. S. F., Fonseca, V. A. da S., Silva, E. N., Castro, M. C. S. de, & Martins, W. de A. (2018). Comparison of two smoking cessation interventions for inpatients. *Jornal Brasileiro De Pneumologia: Publicacao Oficial Da Sociedade Brasileira De Pneumologia E Tisiologia*, 44(3), 195–201. <https://doi-org.ezproxy.uakron.edu:2443/10.1590/S1806-37562017000000419>
- Centers for Disease Control and Prevention (2018). Health Effects of Cigarette Smoking. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/
- Centers for Disease Control and Prevention (2019). Current Cigarette Smoking Among Adults in the United States. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Centers for Disease Control and Prevention. (2020). Electronic Cigarettes.

https://www.cdc.gov/tobacco/basic_information/e-cigarettes/index.htm

Cooper, Loukas, Harrell, Perry. (2017). College students' perceptions of risk and addictiveness of e-cigarettes and cigarettes. *Journal of American College Health*, 65(2), 103-111. doi: 10.1080/07448481.2016.1254638.

Copeland, A. L., Peltier, M. R., & Waldo, K. (2017). Perceived risk and benefits of e-cigarette use among college students. *Addictive Behaviors*, 71, 31–37. [https://doi-org.ezproxy.uakron.edu:2443/10.1016/j.addbeh.2017.02.005](https://doi.org.ezproxy.uakron.edu:2443/10.1016/j.addbeh.2017.02.005)

Hershberger, A. R., Karyadi, K. A., VanderVeen, J. D., & Cyders, M. A. (2017). Beliefs About the Direct Comparison of E-Cigarettes and Cigarettes. *Substance Use & Misuse*, 52(8), 982–991. <https://doi.org/10.1080/10826084.2016.1268628>

Ickes, M.J., Rayens, M.K., Wiggins, A.C., Hahn, E.J. (2015). A tobacco-free campus ambassador program and policy compliance. *Journal of American College Health*, 63(2), 126-133.
<http://web.b.ebscohost.com.ezproxy.uakron.edu:2048/ehost/pdfviewer/pdfviewer?vid=54&sid=dade9ef2-afba-4034-8c43-415f7685ff6b%40sessionmgr101>

Kenne, D.R., Mix, D., Banks, M., Fischbein, R. (2016). Electronic cigarette initiation and correlates of use among never, former, and current tobacco cigarette smoking college students. *Journal of Substance Abuse*, 21(5), 491-494. doi 10.3109/14659891.2015.1068387

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

- Lanza & Teeter. (2018). Electronic nicotine delivery systems (e-cigarette/vape) and co-occurring health-risk behaviors among an ethnically diverse sample of young adults. *Substance Use and Misuse*, 53(1), 154-161. doi: <https://doi.org/10.1080/10826084.2017.1327975>.
- Lee, H.Y. et al. (2018). The effect of e-cigarette warning labels on college student's perception of e-cigarettes and intention to use e-cigarettes. *Addictive Behaviors*, 76, 106-112. doi: <https://doi.org/10.1016/j.addbeh.2017.07.033>
- Loukas, A., Chow, S., Pasch, K. E., Li, X., Hinds Iii, J. T., Marti, C. N., Harrell, M. B., Creamer, M. R., & Perry, C. L. (2016). *College students' polytobacco use, cigarette cessation, and dependence*. *The American journal of health behavior*, 40(4), 514–522. <https://doi.org/10.5993/AJHB.40.4.13>
- Mantey, D. S., Cooper, M. R., Loukas, A., & Perry, C. L. (2017). E-cigarette Use and Cigarette Smoking Cessation among Texas College Students. *American Journal of Health Behavior*, 41(6), 750–759. <https://doi-org.ezproxy.uakron.edu:2443/10.5993/AJHB>.
- Peña-Purcell, N. C., Rahn, R. N., & Atkinson, T. D. (2018). Assessing College Students' Perceptions About Cigarette Smoking: Implications for Prevention. *American Journal of Health Education*, 49(3), 147–154. <https://doi-org.ezproxy.uakron.edu:2443/10.1080/19325037.2018.1428701>
- Record, R. A. (2017). Tobacco-free policy compliance behaviors among college students: A theory of planned behavior perspective. *Journal of Health Communication*, 22(7), 562–567. <https://doi-org.ezproxy.uakron.edu:2443/10.1080/10810730.2017.1318984>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Saddleson, M.L., Kozlowski, L.T., Giovino, G.A., Hawk, L.W., Murphy, J.M. MacLean, M.G.,

Goniewicz, M.L., Homish, G.G., Wrotniak, B.H., & Mahoney M.C. (2015). Risky

behaviors, e-cigarette use and susceptibility of use among college students. *Drug and*

Alcohol Dependence, Volume 149, 2015, Pages 25-30, ISSN 0376-8716,

<https://doi.org/10.1016/j.drugalcdep.2015.01.001>.

Simmons, V. N., Webb, M. S., & Brandon, T. H. (2004). College-student smoking: an initial test of an experiential dissonance-enhancing intervention. *Addictive Behaviors*, 29(6), 1129–1136.

<http://search.ebscohost.com.ezproxy.uakron.edu:2048/login.aspx?direct=true&db=mnh&AN=15236813&site=ehost-live>

Spears, C.A. et al. (2017). Mechanisms underlying mindfulness-based addiction treatment versus cognitive behavioral therapy and usual care for smoking cessation. *Journal of Consulting and Clinical Psychology*, 85(11), 1029-1040. <https://psycnet-apa-org.ezproxy.uakron.edu:2443/fulltext/2017-27624-001.pdf>

Spindle, T. R., Hiler, M. M., Cooke, M. E., Eissenberg, T., Kendler, K. S., & Dick, D. M. (2017). Electronic cigarette use and uptake of cigarette smoking: A longitudinal examination of U.S. college students. *Addictive Behaviors*, 67, 66–72. <https://doi-org.ezproxy.uakron.edu:2443/10.1016/j.addbeh.2016.12.009>

Sutfin, E. L., McCoy, T. P., Morrell, H. E. R., Hoepfner, B. B., & Wolfson, M. (2013).

Electronic cigarette use by college students. *Drug and Alcohol Dependence*, 131(3), 214–221. <https://doi-org.ezproxy.uakron.edu:2443/10.1016/j.drugalcdep.2013.05.001>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Thomas, Luo, Bengston, Wang, Ghidei, Nyman, Lust, Wetter, Epstein, & Ahluwalia, (2015).

Enhancing quit and win contests to improve cessation among college smokers: A randomized clinical trial. *Society for the Study of Addiction*, *111*, 331-339. doi: 10.1111/add.13144.

Trumbo, C.W., Kim, S.J. (2015). The effect of electronic cigarette advertising on intended use among college students. *Journal of Addictive Behaviors*, *46*, 77-81. doi 10.1016/j.addbeh.2015.03.005.

Truth Initiative (2019). E-cigarettes: Facts, stats and regulations.

<https://www.truthinitiative.org/research-resources/emerging-tobacco-products/e-cigarettes-facts-stats-and-regulations>.

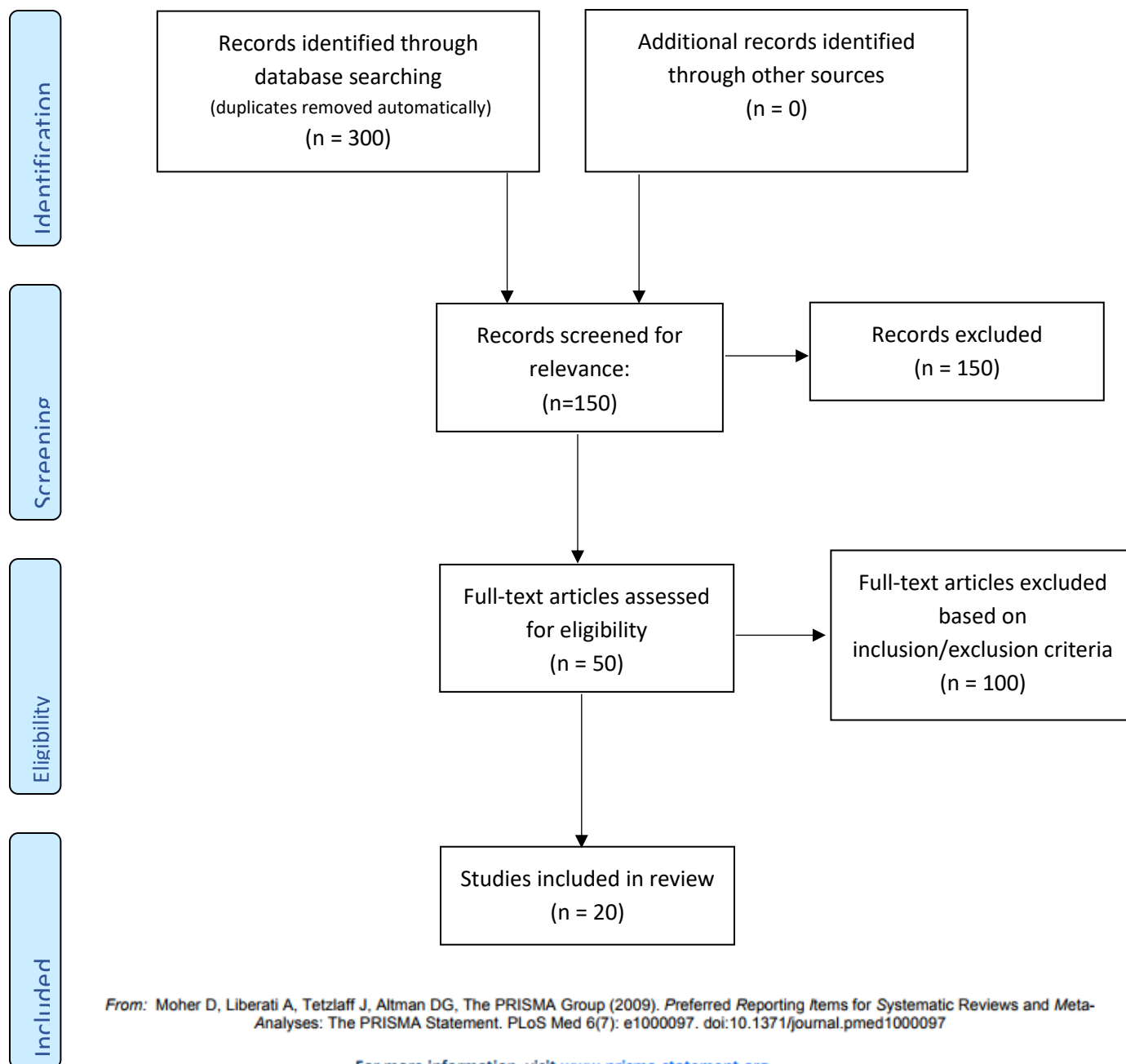
Walton K., Wang T.W., Schauer G.L., Hu, S., McGruder, H.F., Jamal, A., & Babb, S. (2019). State-Specific Prevalence of Quit Attempts Among Adult Cigarette Smokers — United States, 2011–2017. *MMWR Morb Mortal Wkly Rep* 2019; 68:621–626.

<http://dx.doi.org/10.15585/mmwr.mm6828a1>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Appendix A

PRISMA 2009 Flow Diagram



SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

Appendix B

Systematic Review Table of Evidence

APA formatted reference	Purpose statement, Research question [2].	Clinical Practice Setting, Sampling methods, Sample size [3].	Design, Level of Evidence.[4]	Findings, Conclusion [5]	Practice & Research Implications [6]	Critical Appraisal. Strengths and limitations [7]
1 Loukas, Chow, Pasch, Li, Hinds, Marti, Harrell, Creamer, & Perry. (2016). College students' polytobacco use, cigarette cessation, and dependence. <i>The American Journal of Health Behavior</i> , 40(4), 514-522 . doi: 10.5993/AJHB.40.4.13.	<p>Purpose Statement: Tobacco and E-cigarette use in college students.</p> <p>Research question: What is the pattern of tobacco and electronic cigarettes use among college students?</p>	<p>Setting: 24 Colleges in Texas in Houston, Dallas/ Fort Worth, San Antonio, Austin.</p> <p>Sampling method: All students either 2-year vocational school or 4- year college; each school had to have a minimum of 2500 students.</p> <p>Sample size: 5,468</p>	<p>Design:</p> <p>Online survey; does not give specific design.</p> <p>Level of Evidence:</p> <p>Unknown</p>	Findings and Conclusions: More students used hookah and e-cigarettes as an alternative to cigarettes. Hookah does cause negative effects. Older college students used more than one product when compared to younger students. Younger students used an alternative product (not cigarettes) because they perceived it as safer. Students who began smoking young and smoked more than one product were more likely to have a need for cigarettes later. The younger the age of initial smoke, the higher nicotine dependency. Those who have a need for cigarettes have decreased autonomy and increased tobacco addiction.	Implications: It is important to know how patients perceive alternative tobacco products because manufacturers are deeming them safer. Also, this study looks at tobacco use and alternative products in college students, which can contribute to the research why people are smoking in college (addiction started in adolescence?). Also, it looked at multiple product use which impacts how physical dependence and treatments for smoking cessation (how likely will a student quit vaping when they already stopped using a cigarette?)	<p>Strengths: Analyzed poly tobacco product use in a large sample size, while considering the entire spectrum of alternative products. Used the college aged population where nicotine addiction is high and initiation to smoke is high.</p> <p>Limitations: Not cross-sectional which prevents examining the effect of polytobacco use to dependency, nor does it examine whether people who attempt to quit smoking remain in smoking cessation (Loukah et al). Results cannot be applied to other colleges.</p>
2 Berg, C. J., Stratton, E., Sokol, M., Santamaria, A., Bryant, L., & Rodriguez, R. (2014). Novel incentives and messaging in an online	Purpose Statement: examine feasibility, acceptability, and potential effectiveness of an	Setting: Two Southern U.S. Universities	RCT	Findings and Conclusions: Intervention involved health behavioral monitoring, targeted messaging, and incentives for health goods and services, which demonstrated feasibility and	Implications: It is important to examine potential effective interventions to get college students to stop smoking. As a nurse, we are to teach patients about the effects of	<p>Strengths: Age range 18-30; randomized sampling</p> <p>Limitations: Small sample size</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

college smoking intervention. <i>American Journal of Health Behavior</i> , 38(5), 668–680. https://doi.org.ezproxy.uakron.edu/2443/10.5993/AJHB.38.5.4	<p>online intervention targeting college smokers.</p> <p>Problem Statement: Smoking continues to be the leading preventable cause of morbidity and mortality in the U.S., and it needs to be addressed, but will online preventions work better than other methods to retain cessation efforts?</p>	<p>Sampling Methods: Students at 2 colleges were recruited via email to complete an online survey. To be eligible, had to be between the ages of 18-30 and smoked in the last 30 days. Email went out to 5000 students at each school, and 122 met all eligibility requirements.</p> <p>Sample Size: 122 current smokers</p>	<p>Level of Evidence: 2</p>	<p>acceptability. 19.9% of young adults smoke. Non-daily smoking increased in young adults (YA) and is related to smoking related morbidity and mortality. Non-daily smokers are not as motivated to, less confident, less likely to identify as a smoker, less likely to get assistance, and less likely to think of smoking cessation. Among nondaily and daily smokers in study, 95% of students adhered to the intervention and 41% in the group that had the intervention remained abstinent (the control group was 23%, control group was ACS Guide to Quitting Smoking online).</p> <p>This study suggests that an online intervention targeting factors specific to young adult smoking is feasible and acceptable and that greater engagement can be achieved by using an incentive strategy modeled after many current "deal of the day" programs.</p>	<p>smoking and ways to stop, especially if the patient is in the contemplation phase. Because college students are not limited to smoking cigarettes (i.e. many use e-cigarettes), then it is important to look at the impact of this online intervention. Can this be used to stop using e-cigarettes?</p>	
3. Trumbo, C.W., Kim, S.J. (2015). The effect of electronic cigarette advertising on intended use among college students. <i>Journal of Addictive Behaviors</i> , 46, 77-81. doi 10.1016/j.addbeh.2015.03.005.	<p>Purpose statement: the effect of advertising and current beliefs about e-cigarettes in relation to increased sales.</p> <p>Problem Statement: Does the effect of advertising of e-cigarettes in college</p>	<p>Setting: A southeastern US university</p> <p>Sample Method: Via email, convenience sampling</p>	<p>Design: Analyzed cross-sectional.</p> <p>Level of Evidence:</p>	<p>Findings and Conclusions: The study looked at the effects of advertising of e-cigarettes in college students. It analyzed the correlations between attitudes, norms, appeal, and tobacco use. It used two top companies for two ads, and one company with lower sales in another ad, with ads occurring randomly. It found that students' norms and attitudes independently correlated to intent to use later in but is not the main drive for students to start using. Also, Addictiveness and appeal positively correlated to intent to use later. However,</p>	<p>Implications: This study is important because advertising e-cigarettes are everywhere, and studies on college students are limited. The effects of e-cigarettes long term and short term are not completely understood. Taking care of patients who ask us about the effectiveness and safety of e-cigs need to be educated that it is not completely understood about their effects. Also, nicotine addiction and e-cigarettes continue this issue because ads are promoting their use</p>	<p>Strengths: Adds to data about college students and e-cigarettes. Helps lead further studies to look at ad effects. Supports and adds to the fact that students perceived e-cigs as less addictive. Provides a direction on how to combat advertising by understanding the variables correlations and why students choose to use e-cigarettes later.</p> <p>Limitations: Pilot study using convenience sampling (but there is little literature about college students). Decreased generalizing. Cross-sectional, Retrospective. Environment</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

	students increase use later in life?	Sample Size=296	4	variables of ever smoked, attempted cigarettes, or used alternative tobacco products did not drive students' belief of addictiveness (less addictive) and appeal (positive look), because those appeal and addictiveness are moderately correlated when measured together. Therefore, those who start using e-cigarettes perceived them as less addictive because ads are making them look more pleasing (not because they have already smoked, which seems to not drive someone to use e-cigs. Lastly, there is an independent and positive correlation between tobacco use and intent to use later, which supports that nicotine addiction will remain a problem, especially after e-cigarettes have been introduced.	of being less addictive and acceptable to use. We as nurses must continue educating the patient on smoking cessation and being their advocate for getting them into programs to help with stop. Also, we need to educate patients on the bandwagon effect of using e-cigarettes because ads are promoting them as acceptable. Again, the short- and long-term effects are not understood.	where surveys completed was not assessed previously to decrease or eliminate biases.
4 Cooper, Loukas, Harrell, Perry. (2017). College students' perceptions of risk and addictiveness of e-cigarettes and cigarettes. <i>Journal of American College Health</i> , 65(2), 103-111. doi: 10.1080/07448481.2016.1254638.	<p>Purpose:</p> <p>Not many studied examine why college students use both e-cigarettes and conventional cigarettes.</p> <p>Problem:</p> <p>Why is the use of e-cigarettes increasing while conventional cigarettes are increasing among the college student population?</p>	<p>Setting:</p> <p>Texas, 24 colleges</p> <p>Sample Methods:</p> <p>Email online survey</p> <p>Sample Size:</p> <p>5,482</p>	<p>Design:</p> <p>Cross- sectional</p> <p>Level:</p> <p>4</p>	Findings and Conclusions: Dual users and exclusive users claim that e-cigarettes have little or no harm when compared to cigarettes, may be due in part to advertising. Cigarette users claim that cigarettes are somewhat more addictive when compared to e-cig only users. 2.08% claim cigarettes have little or no harm, 46.74% claim ee-cig have little or no harm. 86.16% see cigarettes as very addictive and 29.23% see e-cigarettes as very addictive.	Implications: It is important to assess our patients current understanding about the level of addictiveness and harm associated with e-cigarettes and cigarettes. Then we can begin to motivate them to change, and teach them about the effects of e-cigarettes and cigarettes.	<p>Strengths: used a measure of absolute instead of measure of relative in terms of harm and addictiveness. Prevents participants from rating alternative tobacco products as positive versus cigarettes by making separate questions to measure absolute comparisons.</p> <p>Limitations: cross-sectional; limited to Texas colleges, so cannot be generalized</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

<p>5Record, R. A. (2017). Tobacco-free policy compliance behaviors among college students: A theory of planned behavior perspective. <i>Journal of Health Communication</i>, 22(7), 562–567. Retrieved from: https://doi-org.ezproxy.uakron.edu/2443/10.1080/10810730.2017.1318984</p>	<p>Purpose Statement:</p> <p>Examine the theory of planned behavior as a framework of understanding tobacco-free policy compliance behaviors</p> <p>Problem: While smoking cigarettes and secondhand smoking decreases with tobacco-free campus policies, compliance rates on campuses are not consistent.</p>	<p>Setting:</p> <p>Undergrad students in southern US university campus in the tobacco belt</p> <p>Sampling Method:</p> <p>Recruited through registrar's office.</p> <p>Sample Size: 479</p>	<p>Design:</p> <p>RCT</p> <p>Level 2</p>	<p>Findings and Conclusions: Attitudes, subjective norms, and behavioral control regarding compliance with tobacco-free policy were positively associated with intention to comply with the tobacco free policy. Increased compliance is associated with decreased likelihood of smoking on campus. While tobacco use is heavily influenced by addiction, compliance to tobacco free policy is largely influenced by perceived attitudes, subjective norms, and behavioral control.</p>	<p>Implications: It is important for nurses to understand that tobacco-free compliance is not solely influenced by addiction itself</p>	<p>Strengths: Random sampling; gender is evenly distributed (51% male; 49% female)</p> <p>Limitations: Large age range 18-63 yrs. Old; data collected on one college campus</p>
<p>6 Spears, Wu, Vinci, Vidrine, Waters, Hedeker, Anderson, Houchins, Hoover, Cinciripini, & Wetter. (2017). Mechanisms underlying mindfulness-based addiction treatment versus cognitive behavioral therapy and usual care for smoking cessation. <i>Journal of Consulting and Clinical Psychology</i>, 85(11), 1029-1040. Retrieved from https://psycnet-apa-org.ezproxy.uakron.edu/2</p>	<p>Purpose Statement:</p> <p>Examine how effective MBAT, CBT, and UC are in smoking cessation.</p> <p>Problem Statement:</p> <p>Compared with standard smoking cessation treatment, do mindfulness-based interventions produce more</p>	<p>Setting: Houston, TX</p> <p>Sampling Method: Data collected from parent study which compared the efficacy of MBAT to CBT and UC for smoking cessation. The study by Spears et al (2017) looked at the underlying</p>	<p>Design:</p> <p>RCT</p> <p>Level: 2</p>	<p>Findings and Conclusions: MBAT vs CBT and UC: increased willful control over smoking and volatility of anger. Both CBT and MBAT were effective in addressing the underlying mechanisms in tobacco dependence.</p> <p>MBAT produced less anxiety, less attentional bias to start smoking, had higher concentration levels, less cravings, decreased exhibition of smoking dependence motives, higher self-efficacy when feeling negative emotions compared to UC.</p>	<p>Implications: As nurses we are involved in getting our patients into certain programs that will benefit them. This is part of being a patient advocate. If we get a college aged patient who is ready to give up smoking, then we can provide information for more effective treatments. MBAT teaches mindfulness, and mindfulness is a very effective way to examine thoughts. CBT is part of treatment for substance abuse disorders.</p>	<p>Strengths RCT, large sample size</p> <p>Limitations: Indicators and these were not in study. Did not look at informal mindfulness sessions. Abstinence rates were greater at week four then week 26.</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

443/fulltext/2017-27624-001.pdf	favorable cognitive and emotional outcomes, which could improve chances of quitting?	mechanisms of MBAT vs. CBT and UC. Participants for study recruited via print media. Sample Size: 412		MBAT had higher “volitional control over smoking” compared to CBT and UC. MBAT established control in behavior through purposeful thinking. CBT participants had less stress and negative emotions compared to MBAT and UC. Compared to UC, CBT indirect effects: less stress, increased self-efficacy when person felt negative emotions to start smoking. Compared to CBT, MBAT enabled participants to have better concentration and more likely stay abstinent by week 26. MBAT showed decreased cravings and higher self-efficacy when compared to UC, which was associated with abstinence at week 4. MBAT decreased factors of tobacco dependence (automaticity, loss of control, external cues and behavior, negative reinforcement.		
7. Lanza & Teeter. (2018). Electronic nicotine delivery systems (e-cigarette/vape) and co-occurring health-risk behaviors among an ethnically diverse sample of young adults. <i>Substance Use and Misuse</i> , 53(1), 154-161. doi: https://doi.org/10.1080/10826084.2017.1327975 .	Purpose Examine what is involved in the ENDS use, including e-cigs. Problem: Why are e-cigarettes and other ENDS being used more and	Sample Size 452 Sample Method Approached and public awareness of study recruited participants.	Design Cross-sectional Level of evidence: 4	Findings and Conclusions: Those who have friends who use ENDS are more likely to use ENDS because their friend gives it to them, rather than going to a store and getting one. Those who use ENDS have more friends who also use it vs those who do not use ENDS. Other studies included in this article explains that social acceptance may be an important push for those to start using ENDS (because it is socially acceptable). Using ENDS may be appealing due to it being a risky behavior and because it reduces negative emotions. Most ENDS users did not start using to stop smoking	Clinical Implications: Nurses are to educate health promotion and disease prevention in all patients. We need to know why young adults are using e-cigarettes in order to tell them: I recommend you quit smoking. Research has shown that e-cigs are not a recommended alternative for smoking cessation.	Strengths: Adds to the gap of knowledge about how and where ENDS use occurs and why people use it rather than conventional cigs. Ethnically diverse. Limitations: May have been influenced by social desirability bias, some students may not have been comfortable answering substance use questions, cross sectional; needs a more representative sample. Did not examine the frequency and severity of use.

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

	more in the college aged population?	Setting California undergrads		tobacco but for a coping mechanism or to experience it. Those who tried ENDS but never smoked a conventional cigarette (1/3) may have tried because it is “cool, trendy, and uniquely different” than conventional cigs. ENDS use is increases likelihood of using if participants fell into: former and regular current smokers. Those who tried cigs more likely to try ENDS. ENDS users may start binge drinking. No differences in sex and ENDS use, maybe due to ethnic diversity. ENDS are considered a social norm.		
8 Ickes, M.J., Rayens, M.K., Wiggins, A.C., Hahn, E.J. (2015). A tobacco-free campus ambassador program and policy compliance. <i>Journal of American College Health</i> , 63(2), 126-133. http://web.b.ebscohost.com.ezproxy.uakron.edu:2048/ehost/pdfviewer/pdfviewer?vid=54&sid=dade9ef2-afba-4034-8c43-415f7685ff6b%40sessionmgr101	Purpose: There is not enough enforcement in tobacco-free campuses to remain compliant. Awareness fails to be enough to remain compliant. Problem: Is this tobacco-free ambassador program effective and feasible in increasing compliance in students while remaining cost effective?	Setting: A southeastern public university Sample method: Did not require IRB approval, no recruiting. Volunteers of undergrad students on the campus Sample size: 529	Design: Pre-test Quasi-experimental Level of Evidence: 3	Findings and Conclusions: There was a 65% decrease in violators of the tobacco-free campus, and a 35% decrease in how number of cigarette butts found within 3 days per wave 1 and 2. The program for 28,000 students proved to be feasible for cost and compliance rates. 89% violators were compliant once approached compassionately and stern by ambassadors about violating the policy, for wave 1, and a 96% compliancy for violators once approached the same way for wave 2.	Clinical Implications: There is a gap of information on EBP interventions in smoking cessation for college students. This study provided information in the gap of knowledge about ways to enforce compliance to tobacco free campus policy, which may be an effective intervention when enforced.	Strengths: Proved feasible in terms of cost and compliance rates (worth spending) r/t to a decrease in cig butts by the end of wave 1 and 2. Added to lack of EBP knowledge in this population to induce smoking cessation. Limitations: incomplete amount of time for ambassadors at each location. Elapsed time was not able to be assessed, which impacts training. Hotspots may have changed throughout the study, which decreases generalization ability.

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

<p>9 Kenne, D.R., Mix, D., Banks, M., Fischbein, R. (2016). Electronic cigarette initiation and correlates of use among never, former, and current tobacco cigarette smoking college students. <i>Journal of Substance Abuse</i>, 21(5), 491-494. doi: 10.3109/14659891.2015.1068387.</p>	<p>Purpose:</p> <p>college students are at risk for using e-cigarettes but this population is not studied enough.</p> <p>Problem:</p> <p>What influences college students to begin using e-cigarettes?</p>	<p>Setting:</p> <p>One Midwestern university and its associated regional campuses</p> <p>Sample Method:</p> <p>Email survey; those completed the survey could be in a prize drawing</p> <p>Sample Size: 9,077</p>	<p>Design:</p> <p>Cross-sectional</p> <p>Level: 4</p>	<p>Findings and Conclusions: Builds on the current few studies done on correlates and prevalence of college students using e-cigarettes. Based on the study results, there is a significant increase in e-cigarette use in college students. However, the university used is considering the proposition of placing an e-cigarette ban along with a no smoking policy. The study reports the claim the study reported that students in Greek Life were more likely to have e-cigarette use, and females reported the less likelihood of using an e-cigarette. Those who reported being a current smoker and reported having the highest rate of lifetime e-cigarette use is expected and the authors add that those who do so may use e-cigarettes to engage in smoking cessation or to be in compliance to the non-smoking policy. 13.9% of those who are never smokers reported they have used an e-cigarette. There are questions whether that those who are never smokers who begin using e-cigarettes will become nicotine dependent and use e-cigarettes to start using tobacco cigarettes. Based on the demographic results and whether or not people will use e-cigarettes, it is suggested that intervention and prevention strategies should be based on the 3-smoking statuses.</p>	<p>Implications: This is relevant to our paper and in nursing. It is important to know how people perceive e-cigarettes. Also, knowing that the study found that those who never smoked before start using e-cigarettes may use it start smoking cigarettes. As nurses, we can see how prevalent e-cigarettes use is and its perceived harm and benefits. Those who have never smoked and want to smoke e-cigarettes will need specific prevention techniques than those who smoked cigarettes and are switching to e-cigarettes, which was noted in the study. Also, those who smoke e-cigarettes think they are being compliant to non-smoking campuses, so prevention strategies as nurses need to be altered. Using the data in this study, it is important to come up with prevention strategies for former and never smokers and each of its subgroups, and intervention strategies for current smokers and its subgroups. This paper wants to know ways to enable smoking cessation, so we need to know the attitudes about e-cigarettes and the risks that those who are smoking cigs will turn to e-cigarettes.</p>	<p>Strengths: High sample size; assessed subgroups and smoking status.</p> <p>Limitations: Cross-sectional is good to look at in terms of estimating prevalence, it is subject to nonresponse bias. Those who participated in the survey may have quickly went through it to get into the prize drawing. Threatened by internal validity, though collecting drug abuse data through self-reported means is seen as “valid and reliable” (Darke et al., 1987; Kokkevi et al., 1997). Limited to one Midwestern university and associated regional campuses, causing limited generalization. Did not look how often use, 12-month use, or 30 day use of e-cigarettes. Could not differ between non-daily e-cigarette user from daily users.</p>
<p>10. Lee, Lin, Seo & Lohrmann. (2018). The effect of e-cigarette warning labels on college</p>	<p>Purpose</p>	<p>Setting:</p>	<p>Controlled with randomization;</p>	<p>Findings and Conclusions: FDA warning label was more effective than e-cigarette company label. The label design influenced the intent. In terms of belief,</p>	<p>Implications: This article measures intent, perceptions of risk and harm before and after seeing two labels. It is important for further research and</p>	<p>Strengths: examined label effects on intent to use e-cigarettes in college students. Results</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

<p>student's perception of e-cigarettes and intention to use e-cigarettes. <i>Addictive Behaviors</i>, 76, 106-112. doi: https://doi.org/10.1016/j.addbeh.2017.07.033</p>	<p>what is the effect of warning labels on e-cigarettes to college student's beliefs about them and their intent to use it (are they risky? Addictive?)</p> <p>Problem: There is no mandated label for e-cigarettes companies that are effective in minimizing intent to use e-cigarettes.</p>	<p>A Midwestern university of undergrads</p> <p>Sample Size: 666</p> <p>Sample Method</p> <p>Two group pretest-posttest; questionnaire</p>	<p>two group pretest and posttest.</p> <p>Level of Evidence: 3</p>	<p>there is a correlation between perceptions of benefits and before the label, but not because of the design. The students' perceptions of risk before label are associated to their perceptions of risk after labels. Intent is associated with perceptions of benefits, perceptions of risk after label, knowledge, and previous experience. Label effect does not decrease intent based on label design. Label design is not associated with perceptions of risk and benefits after looking at it. Intent is associated with perceptions of benefits after label and previous experience. Finally, FDA label for readability and comprehensibility was greater than e-cigarette company label. Also, design and effect are associated. Knowledge was associated with intent. Previous experience is associated to intent to try e-cigarettes. Intent is influenced by perceptions and label design. Therefore, better designs decrease intent. On the other hand, perceptions of benefits were not associated with label effect. The effect of warning labels is about increasing risk knowledge, so the person may now believe that e-cigarettes are safer than cigarettes. The authors propose because the health effects of e-cigarettes are not completely understood, people believe they are less harmful and are more likely to use them than cigarettes. Young adults, which includes college students, have the highest use of e-cigarettes, which continues the nicotine addiction problem. For smoking cessation, the students/YA need to be educated on the fact that safer options does not mean complete safety. Also, educate this population that the health effects are not completely understood.</p>	<p>patient education that there are mandated labels to effectively warn people of the consequences of e-cigarettes. Label effects help initiate smoking cessation, which is part of patient education for those who currently smoking and for those who are expressing desire to. Nurses are to help others maintain optimal health. By using this articles information on effectiveness of label, we can see how likely people will smoke after seeing a label such as the FDA one. We treat patients with diseases associated with tobacco derived products, such as lung cancer and emphysema. Nursing education is constant.</p>	<p>provide a direction for label mandations. RCT two group pretest-posttest.</p> <p>Limitations: self-administered questions may have inaccurate information and respondent bias. Convenience sampling (level 3 b/c it is a RCT) decreases generalizing. Only looked at college students.</p>
--	--	--	--	---	--	---

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

				FDA label for readability and comprehensibility was greater than e-cigarette company label. Though quantity of words does not influence effect, the label may be less effective if there is a lot to read. Label design is associated with readability and effectiveness, therefore that is why the design influences intent to use e-cigarettes. Authors propose that short and trusted information is more effective. FDA label decreased intent, while the other label did not affect intent.		
11 Copeland, A. L., Peltier, M. R., & Waldo, K. (2017). Perceived risk and benefits of e-cigarette use among college students. <i>Addictive Behaviors</i> , 71, 31–37. https://doi-org.ezproxy.uakron.edu/2443/10.1016/j.addbeh.2017.02.005	<p>Purpose Statement: This study aimed to identify perceptions regarding the safety and usefulness of e-cigarettes among college-aged students and details the development of a questionnaire for assessing these perceptions.</p> <p>Problem: Although e-cigarettes have been shown to reduce craving and nicotine withdrawal symptoms, their efficacy as a long-term aid to smoking cessation has yet to be determined-research to date has failed to support the role of e-cigarettes</p>	<p>Setting:</p> <p>University of Louisiana</p> <p>Sampling Method: Random Sampling within the Psychology department's research participant pool</p> <p>Sampling Size: 734</p>	<p>Design:</p> <p>RCT</p> <p>Level of Evidence:</p> <p>2</p>	<p>Findings and Conclusions: The current results suggest that college-age students who use e-cigarettes perceive benefits to be associated with e-cigarette use and continue to use or experiment e-cigarettes despite not acknowledging the negative health consequences of e-cigarettes.</p>	<p>Implications: Given the current increase of e-cigarette marketing and use on college campuses, the development of specific, tailored interventions to address the increasing use of e-cigarettes in college students is needed.</p>	<p>Strengths: large sample size.</p> <p>Limitations: only conducted at one university, primarily female students, primarily Caucasian students.</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

	as an effective cessation tool.					
<p>12 Spindle, T. R., Hiler, M. M., Cooke, M. E., Eissenberg, T., Kendler, K. S., & Dick, D. M. (2017). Electronic cigarette use and uptake of cigarette smoking: A longitudinal examination of U.S. college students. <i>Addictive Behaviors</i>, 67, 66–72. https://doi-org.ezproxy.uakron.edu/2443/10.1016/j.addbeh.2016.12.009</p>	<p>Purpose Statement:</p> <p>To examine the extent to which e-cigarette use among never cigarette smokers at time 1 of the study was predictive of cigarette smoking status at time 2.</p> <p>Problem:</p> <p>Furthermore, the extent that e-cigarette use is associated with the onset of cigarette smoking and the factors that lead to the uptake of e-cigarettes in college students has not been explored.</p>	<p>Setting:</p> <p>A Mid-Atlantic University (Virginia Commonwealth University)</p> <p>Sampling Method:</p> <p>Random Sampling with a questionnaire given in 2014 and again in 2015.</p> <p>Sample Size: 3757</p>	<p>Design:</p> <p>RCT</p> <p>Level of Evidence:</p> <p>2</p>	<p>Findings and Conclusions: Among participants reporting never smoking at time 1, those who had ever tried e-cigarettes or were currently using e-cigarettes (at least one use in the past 30 days) were more likely to have ever tried cigarettes by time 2 relative to individuals who had not used e-cigarettes. Ever use of e-cigarettes (but not current use) also increased participants' likelihood of being current cigarette smokers at time</p>	<p>Implications: Given that never-smoking participants who had tried e-cigarettes were more likely to initiate cigarette use later, limiting young adults' access to these products may be beneficial. As the long-term health implications of e-cigarette use become clearer, predictors of e-cigarette use could help identify future populations likely to use and abuse these products.</p>	<p>Strengths: The present study contained a rather large and diverse sample relative to other examinations of e-cigarette use using college/university samples.</p> <p>Limitations: the sample was limited to a single university in one geographic area. Thus, these results may not be generalizable to college students in other parts of the country. Also did not differentiate between types of e-cigarettes.</p>
<p>13 Campos, A. C. F., Nani, A. S. F., Fonseca, V. A. da S., Silva, E. N., Castro, M. C. S. de, & Martins, W. de A. (2018). Comparison of two smoking cessation interventions for inpatients. <i>Jornal Brasileiro De Pneumologia: Publicacao</i></p>	<p>Purpose Statement:</p> <p>This study aimed to compare the effectiveness of two cognitive behavioral therapy-based smoking cessation interventions</p>	<p>Setting: A university hospital- Antonio Pedro University Hospital in Brazil</p>	<p>Design: RCT</p>	<p>Findings and Conclusions: The inclusion of an educational video proved effective in reducing relapse rates.</p>	<p>Implications: This information can help hospitals introduce use of CBT interventions for those who smoke.</p>	<p>Strengths: Looked at CBT as a smoking cessation intervention strategy.</p> <p>Limitations: This study was not conducted in the United states- University of Antonio Pedro in Brazil; small sample size.</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

<p>Oficial Da Sociedade Brasileira De Pneumologia E Tisiologia, 44(3), 195–201. https://doi-org.ezproxy.uakron.edu:2443/10.1590/S1806-37562017000000419</p>	<p>initiated during hospitalization and to evaluate the factors related to relapse after discharge.</p> <p>Problem: Patients feel forced to quit smoking regardless of their level of motivation to do so</p>	<p>Sampling Method: Random sampling of smokers at a university hospital</p> <p>Sample Size: 90</p>	<p>Level of Evidence: 2</p>			
<p>14 Simmons, V. N., Webb, M. S., & Brandon, T. H. (2004). College-student smoking: an initial test of an experiential dissonance-enhancing intervention. <i>Addictive Behaviors</i>, 29(6), 1129–1136. Retrieved from http://search.ebscohost.com.ezproxy.uakron.edu:2048/login.aspx?direct=true&db=mnh&AN=15236813&site=ehost-live</p>	<p>Purpose Statement:</p> <p>To test of whether an experiential learning intervention, based on cognitive dissonance theory, would increase college-student smokers' intentions to quit.</p> <p>Problem: Smoking cessation programs at colleges are often underutilized but college students may be an unrealized opportunity as a target of smoking cessation interventions</p>	<p>Setting:</p> <p>University of South Florida</p> <p>Sampling Method:</p> <p>Selected undergraduates who smoked 10 or more cigarettes a day; randomly split into 1 of four categories.</p>	<p>Design:</p> <p>Experimental design</p> <p>Level of Evidence: 3</p>	<p>Findings and Conclusions:</p> <p>The findings from this initial analogue study suggest that attitudes and intentions to quit smoking can be influenced by a brief experiential intervention.</p>	<p>Implications: Future studies would benefit from increasing the potency of the social–psychological elements of the study and including a follow-up measure of smoking behavior.</p>	<p>Strengths: Related to CBT and intentions of college students to quit smoking; Studied the population of interest (college students).</p> <p>Limitations: Small sample size; The findings from this initial analogue study suggest that attitudes and intentions to quit smoking can be influenced by a brief experiential intervention.</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

	because the college years represent an important transition period in which young adults typically quit or become nicotine dependent	Sample Size: 144				
15 Thomas, Luo, Bengston, Wang, Ghidei, Nyman, Lust, Wetter, Epstein, & Ahluwalia, (2015). Enhancing quit and win contests to improve cessation among college smokers: A randomized clinical trial. <i>Society for the Study of Addiction</i> , 111, 331-339. doi: 10.1111/add.13144.	<p>Purpose</p> <p>To get college students to stop smoking, the authors tested to see if increased financial incentive contests and counseling would bring about the change.</p> <p>Problem</p> <p>College students who smoke is increasing in prevalence.</p>	<p>Sample Size: 1217</p> <p>Sample Method:</p> <p>Email and post cards</p> <p>Setting:</p> <p>Colleges from Minnesota, OH, TX, Wisconsin.</p>	<p>Design: RCT</p> <p>Level of Evidence: 2</p>	Findings/Conclusions: With or without CBT+MI showed no differences at 12 weeks or in maintained abstinence, though may be due to only 20% using all counseling services. Multiple tests with or without counseling showed a greater 19.3% abstinence versus one contest at 10.3% abstinence rate. Multiple contests showed 15.3% halfway through study. Half of those who use no assistance to quit have a 5% abstinence rate, which is very low. Assistance is associated with higher abstinence rates.	Implications: It is important to see what effective EBP strategies can be used for the college aged population. Also, how can all resources be used throughout the study and even not in the study? We want people to be abstinent for good, and this population does not normally seek HCP for smoking cessation. By using online interventions, college students and even the younger population who are also exposed to smoking devices may be enabled to stop or empowered to never start.	<p>Strengths: RCT; more incentives than the standard Quit and Win. May promote self-efficacy which empowers people with the knowledge of quitting so that even though they can't do it now (or think they can't), they may later. A large sample size proved feasibility and acceptability (can be done).</p> <p>Limitations: Nondaily smokers may not have joined in study as they may not see themselves as smokers; higher incentives may prove financial difficulty to be used; chances to win something may have been seen as highly unlikely. Participants may have done study because they are motivated to quit; interpretation of results with multiple contests should be taken with caution.</p>
16 Hershberger, A. R., Karyadi, K. A., VanderVeen, J. D., & Cyders, M. A. (2017). Beliefs About the Direct Comparison of E-Cigarettes and Cigarettes. <i>Substance Use & Misuse</i> ,	<p>Purpose Statement:</p> <p>To create and validate the comparing e-cigarettes and cigarettes</p>	<p>Setting:</p> <p>A large Midwestern University</p>	<p>Design:</p> <p>Controlled Trial without Randomization (Survey)</p>	Findings and Conclusions: Overall, the study demonstrated that individuals view e-cigs as safer and more beneficial than cigarettes, and that such beliefs are higher in those who are current e-cig or cigarette users. The CEAC appears to be a valid and reliable way to assess these	Implications: Comparative beliefs should be contrasted with emerging data concerning negative health effects associated with e-cigs.	<p>Strengths: Large sample size</p> <p>Limitations: While sample 1 represented our target population of college students, sample 2 did not (mean age of 31); Not random</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

52(8), 982–991. https://doi.org/10.1080/10826084.2016.1268628	<p>questionnaire (CEAC) which asks individuals to directly compare e-cigs and cigarettes on a number of dimensions, in two independent samples.</p> <p>Problem: Recent data suggest that positive beliefs about electronic cigarettes (e-cigs) use can lead to later e-cig use. No studies have directly assessed such a comparison between beliefs about e-cigarettes and cigarettes.</p>	<p>Sampling Method: Sample 1: Undergraduate students over the age of 18 at a large Midwestern University; 451. They received course credit for doing the survey. Sample 2: participants were recruited through Mechanical Turk; they were 21 years or older, able to read and understand questions in English, lived in the U.S. and drink alcohol; 699. They received \$0.75 wages for completing the survey.</p> <p>Sample Size: Sample 1: 451; Sample 2: 699. Total Sample Size: 1,150</p>	Level of Evidence: 3	comparative beliefs across product use and gender.		sampling; data conducted at one university-cannot be generalized.
17 Mantey, D. S., Cooper, M. R., Loukas, A., & Perry, C. L. (2017). E-cigarette Use and Cigarette Smoking	<p>Purpose Statement: To examine the relationships between e-cigarette</p>	<p>Setting: Colleges in Texas (24 2- and 4-year institutions in 5</p>	Design:	Findings and Conclusions: 19.1% reported use of e-cigarettes in the past 30 days for reasons other than cigarette smoking cessation and 18.5% reported use of e-cigarettes for cigarette smoking cessation. Use of e-cigarettes for smoking	Implications: Further study is needed to determine the generalizability of the study findings and other contributing	<p>Strengths: Large sample size; college student sample; participants from multiple colleges</p> <p>Limitations: This was not a random sample-subject to self-selection bias; colleges used</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

<p>Cessation among Texas College Students.</p> <p>American Journal of Health Behavior,</p> <p>41(6), 750–759. https://doi-org.ezproxy.uakron.edu/2443/10.5993/AJHB.</p>	<p>use and subsequent cigarette smoking behaviors at 6- and 12-month follow-ups among young adults.</p> <p>Problem:</p> <p>No previous studies have examined the differing impact of smoking cessation among young adults who are using e-cigarettes to quit smoking versus those who report using for other reasons. Determining impact of e-cigarette use on cigarette smoking cessation is a public health priority as smoking remains the leading cause of preventable death in the United States.</p>	<p>counties containing the 4 largest cities in Texas)</p> <p>Sampling Method:</p> <p>Recruited via email; inclusion criteria had to be met. Only participants reporting a history of cigarette smoking.</p> <p>Sample Size:</p> <p>627</p>	<p>Longitudinal analysis of surveillance study</p> <p>Level of Evidence:</p> <p>4</p>	<p>cessation relative to no e-cigarette use, was associated with greater odds of cigarette cessation in a cohort of young adult former and current smokers. The findings are consistent with cross-sectional and longitudinal studies of e-cigarette use in the general population</p>	<p>factors on the efficacy of e-cigarettes as a cessation aid.</p>	<p>were in one state of the U.S.; could not control for variations in e-cigarette product types</p>
<p>18. Sutfin, E. L., McCoy, T. P., Morrell, H. E. R., Hoepfner, B. B., & Wolfson, M. (2013). Electronic cigarette use by college students.</p> <p>Drug and Alcohol Dependence,</p>	<p>Purpose Statement:</p> <p>To estimate the prevalence of e-cigarette use among college students in North Carolina, identify correlates of e-cigarette use among a large,</p>	<p>Setting:</p> <p>North Carolina</p> <p>Sampling Method:</p> <p>Randomly selected students took a</p>	<p>Design:</p> <p>RCT</p>	<p>Findings and Conclusions: 72% of ever e-cigarette users were either former smokers or experimenters. 12% of e-cigarette users had never smoked a conventional cigarette. When asked how harmful compared to a regular cigarette, 50% reported "do not know".</p> <p>Although e-cigarette use was more common among cigarette smokers than</p>	<p>Implications: The findings of this study highlight the general lack of knowledge of the health effects of e-cigarette use showing that more research is needed to fully understand the health effects of e-cigarette use.</p>	<p>Strengths: Large sample size; studied college student population.</p> <p>Limitations: Mostly female sample (63%); not proportional; studied prevalence of e-cigarette use not the use of e-cigarettes for cessation of conventional smoking.</p>

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

131(3), 214–221. https://doi-org.ezproxy.uakron.edu/2443/10.1016/j.drugalcdep.2013.05.001	multi-institution, random sample of college students, and assess correlates of e-cigarette use among current smokers, including associations with cigarette smoking quit intentions, sensation seeking, and other substance use. Problem: From a public health perspective, the extent to which e-cigarettes may serve as a starter product for non-users of tobacco is a concern	web-based survey sent to their email and were sent 15.00 in PayPal for completing the study. Sample Size: 4444	Level of Evidence: 2	non-smokers, 12% of e-cigarette users had never smoked a cigarette. Also, even among current cigarette smokers, e-cigarette use was not related to intentions to quit cigarette smoking. While e-cigarettes may be driven by the desire to quit smoking in populations of older, more established smokers, findings suggest that quit intentions do not play a critical role in e-cigarette use in the college population.		
19 Camenga, D. R., Kong, G., Cavallo, D. A., & Krishnan-Sarin, S. (2017). Current and Former Smokers' Use of Electronic Cigarettes for Quitting Smoking: An Exploratory Study of Adolescents and Young Adults. <i>Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco</i> , 19(12), 1531–1535. doi:10.1093/ntr/ntw248	Purpose Statement: To understand and determine the predictors and prevalence of using e-cigs to stop smoking in adolescence and young adults. Problem: While e-cigs are used to stop smoking, their use	Setting: two middle schools, a high school, and a college in New Haven, Connecticut Sampling Method: Convenience sampling	Design: Cross-Sectional study Level of Evidence 4	Findings and Conclusions: 41.8% of the sample reported that they "have used an e-cigarette to quit smoking". Using e-cigarettes to quit smoking was not associated with current or former cigarette smoking status or perceptions that "e-cigarettes help people quit smoking" or "e-cigarettes are safer than quit smoking medications". Adolescents and young adults who report more frequent e-cigarette use and preference for using flavor combinations are more likely to use e-cigarettes for smoking cessation.	Clinical Implications: Among young established smokers, more frequent e-cigarette uses and preference for using flavors mixed together, but not perceptions of harmfulness of e-cigarettes or comparative safety of e-cigarettes compared with cigarettes or other smoking cessation medications or helpfulness of e-cigarettes in quitting smoking, are associated with using cigarettes for smoking cessation.	Strengths: Age diverse. Adds to what is the prevalence and use of e-cigs in a population that is not fully understood. Limitations: Convenience sampling, not all of the sample were in college. Cross-sectional design makes it hard to make inferences.

SMOKING CESSATION IN COLLEGE STUDENTS: A SYSTEMATIC REVIEW

	was not dependent of current and former smoker status. This does not stop the addiction.	Sample Size: 189				
20. Saddleson, M.L., Kozlowski, L.T., Giovino, G.A., Hawk, L.W., Murphy, J.M. MacLean, M.G., Goniewicz, M.L., Homish, G.G., Wrotniak, B.H., & Mahoney M.C. (2015). Risky behaviors, e-cigarette use and susceptibility of use among college students. <i>Drug and Alcohol Dependence</i> , Volume 149, 2015, Pages 25-30, ISSN 0376-8716, https://doi.org/10.1016/j.drugalcdep.2015.01.001 .	<p>Purpose Statement:</p> <p>To measure prevalence and correlates of e-cigarette use among college students.</p> <p>Problem:</p> <p>Since 2007, there has been a rise in the use of electronic cigarettes, and it may be affecting public health.</p>	<p>Setting:</p> <p>New York</p> <p>Sampling Method:</p> <p>111 items, self-administered, web-based survey.</p> <p>Sample Size: 1437</p>	<p>Design: cross-sectional convenience sampling</p> <p>Level of Evidence: 4</p>	Findings and Conclusions: 95.5% report awareness of e-cigarettes; 29.9% are ever-users and 14.9% are current users of e-cigarettes, with 6.4% reporting concurrent use of both e-cigarettes and tobacco cigarettes.	Clinical Implications: The relationships between e-cigarettes use, susceptibility to e-cigarette use, and participation in certain risky health behaviors is notable, and is important to predict behaviors in college student population.	<p>Strengths: Ages of the participants were 18-23; large sample size; sample was taken from multiple universities.</p> <p>Limitations: Convenience sampling of psychology and health behavior-related course students: may not be representative of all college students; students taking survey may have completed it based on personal interest-bias.</p>